OPERATION OF A PLURALITY OF VISUAL DISPLAY UNITS FROM ONE SCREEN CONTROLLER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method and a circuit arrangement for independent operation of a plurality of visual display units from one screen control unit.

2. Description of the Related Art

In equipment whose control system is based on PC (person computer) technology, a visual display unit is in general operated from a monitor interface which operates, for example, on the VGA Standard and is provided by a special screen control unit which in the example is a so-called VGA controller. The PC software operating system includes an appropriate driver program. If the intention is to connect a plurality of visual display units which are intended to indicate different information at the same time, a dedicated screen control unit is required for each visual display unit.

A plurality of visual display units are in general required wherever a number of people are monitoring data acquisition or processing processes or where different people are each intended to have access to only a part of the overall information. This is the situation, for example, with cash registers or with service terminals which are equipped at least with an operator display and a customer display. In addition, an animation screen is frequently provided for displaying advertising or general information, or else a numerical display device for displaying the reservation number of a next customers To provide a screen control unit for each display unit consumes space and is expensive, as well as having a disadvantageous effect on the processing speed of the PC.

In U.S. Pat. No. 4 965 559, it has therefore been proposed for a plurality of visual display units to be operated from one screen control unit, which emits clock signals and a number of character-related or pixel-related video data signals corresponding to the line and column resolution of a two-dimensional rectangular raster image. In this case, the clock and video data signals which belong to rectangular subareas of the raster image are in each case supplied to a visual display unit. However, in addition, an individual assignment or matching device (look-up table) is required for each visual display unit.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a method and a circuit arrangement which allow the independent operation of a plurality of visual display units from one screen control unit.

The invention provides a method.

The invention uses a screen control unit which can emit clock signals and a number of character-related or pixel-related video data signals corresponding to the line and column resolution of a two-dimensional rectangular raster image which is to be displayed on a visual display unit. One such control unit is, for example, a VGA controller which is known from the PC (person computer) world and whose resolution can be changed between different formats. One frequently used format has a resolution of 640 pixels horizontally and 480 pixels vertically in the graphics mode, and 80 characters/line and 30 lines in the character mode, one character being allocated an area of 8×16 pixels. The format is related to a so-called full screen, as is known from CRT visual display units. The individual pixels and the characters are represented by video data signals. In order to simplify the presentation of the invention, the following description is always based on a full format of 640×480 pixels, corresponding to 30×80 characters. However, the invention can also be applied to any other format.

In addition to full screens, visual display units are also known which have a reduced picture field, for example 320×240, 240×64 or 120×64 pixels, corresponding to 15 lines×40 characters, 4×30 or 4××x15 characters. If the video data signals and the clock signals which transfer them for rectangular sub-areas in the raster frame are supplied to in each case one visual display unit, then a plurality of visual display units can be operated from a single screen control unit.

These visual display units can be arranged physically and separately from one another, for example one on the cashier's side and a second on the customer's side of a cash register, a third in a so-called till indicator above a till workstation, and a fourth anywhere on the sales floor of a large shop.

If it is intended to operate the individual visual display units entirely independently of one another in terms of the information to be displayed, the sum of the characters and pixels which can be displayed on all the visual display units must be less than or equal to the number of data signals emitted by the screen control unit.

However, it is also frequently desirable to display at least parts of the information on a number of visual display units. For example, a screen line which includes the date and time could be displayed on the customer's display and the operator's display. To do this, the video data and clock signals which represent this screen line must be supplied to both visual display units. In this case, the sum of the characters and pixels which are to be displayed on all the visual display units may be greater than the number of data signals emitted by the screen control unit.

Further features and advantages of the invention result from the following description, which explains the invention with reference to a plurality of exemplary embodiments and in conjunction with the attached drawings, in which:

FIG. **1** is a block diagram which shows a circuit arrangement having two visual display units,

FIG. **2** is a block diagram which shows a circuit arrangement having four visual display units, and

FIG. **3** is a block diagram which shows a circuit arrangement having a dual scan visual display unit according to the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **3** shows a block diagram of a known circuit arrangement having a full LCD screen **310** with 640×480 pixels (corresponding to 30×80 characters), which is designed using DSTN (Dual Scan Super Twisted Nematic) technology. As is characteristic of dual scan LCD visual display units, the visual display unit **310** is split into an upper region **312** and a lower region **314**. The upper region **312** is connected to a visual display unit control unit **10** via an upper data bus UDB, and the lower region **314** is connected to a visual display unit control unit **10** via a lower data bus LDB—the visual display unit control unit **10** being a so-called VGA controller. As a further connection between the visual display unit **310** and the VGA controller **10**, a